

# INFORMATION TECHNOLOGY: IT APPLICATIONS

**Written examination**

**SUGGESTED ANSWERS**

## SECTION A – Multiple choice questions (20 marks)

Answers		Explanatory Notes
1.	A	The study design specifies three types of online communities: social, work-based, and project/interest based. The mission in the question is clearly project-based.
2.	C	Evaluation occurs some time after a solution is finished to find out how well it is meeting its original goals.
3.	A	A tutorial is designed to teach users how to carry out operations, often with examples, challenges and revision quizzes. The other forms of documentation provide information about the system. Technical reference does exist, but is not listed in the study design (U4O1) as a required documentation type.
4.	B	Swipe cards and bars on windows are physical security measures. Passwords, encryption, and backup policies are electronic or procedural and are not physical.
5.	C	Taking too long is efficiency. Accuracy is effectiveness. <A> had 2 efficiency measures. <B> and <D> both had two effectiveness measures. Students must know the VCE IT definitions of efficiency and effectiveness.
6.	D	Compulsory usernames and passwords took care of unauthorised people pretending to be a customer.  Secure Socket Layer (SSL) or Transport Layer Security (TLS) took care of data being intercepted and read while in transit between the customer and the website.  A CAPTCHA puzzle requiring users to type in words shown in distorted text took care of robotic software getting into the site to post spam by pretending to be a human visitor.  Automated data backups do <i>not</i> prevent hackers reading any data they manage to steal from the site. Encryption would be needed for that.
7.	C	This is defined in the study design (page 16)
8.	D	Yes/no answers are best stored as Boolean data type. <C> relates to data formatting, <C> is naming. <A> is not the best since Boolean is more efficient in terms of storage space requirements.
9.	B	Using a drop-down list cannot ensure that users choose the <i>right</i> answer (option A). They can, however, force them to choose a <i>valid</i> answer by limiting their choice to only valid options. Students need to distinguish between validation of reasonable data, and testing of accurate information. Option <C> might save the user some time, but not the form designer.
10.	C	An author can only appear once in the Authors table, but the same author can appear many times in the Books table if he/she wrote many books.
11.	A	Students need to know key fields and foreign keys. A key field is the unique identifier for a record that is found only once in the table that defines the entity (usually, the ID has the same name as the table, e.g. AuthorID in the Author table). The same ID appearing in another table is said to be a foreign key, and may appear many times in the foreign table. (e.g. the same authorID can appear many times as a foreign key in the Books lookup table.)
12.	A	A little thought would show that storing the age of something in a database would require never-ending updating of the data over time. A date of birth, on the other hand, is constant and does not require regular maintenance, and from it a current age can be calculated by the database when required.
13.	D	To work at all, key fields must be unique and must exist. The AuthorID in the Author table is a primary key field, so it must meet these criteria. In the Books table, the same applies to its primary key field, BBookID. <B> is not right because the same titles may be used by different authors over time.
14.	B	<B> tests for the right sex, and includes 6 and 11 in the age range. <A> nearly reverses the desired age selection rules. <C> chooses the wrong ranges. <D> excludes people on the borderline ages.

15.	C	<A> does not test for invalid ages. <B> does not test any valid ages. <D> is not efficient since it's unnecessary to test 7, 8, 9 and 10 since they all meet the same criterion. <C> tests valid ages, invalid ages and borderline (boundary) conditions without wasted effort.
16.	D	Students are required to know protocols (U3O1, key knowledge 4) and HTTP and TCP/IP are fundamental web protocols. FTP and SSL are not essential. The items in <C> are not protocols.
17.	B	<B> is quick to do, and checks effectiveness rates. <A> is testing, not evaluation. <C> is not efficient. <D> is also testing, and it checks on the system's efficiency, not its effectiveness.
18.	A	Students need to know the legislation listed in the study design (page 37) – particularly who is bound by the laws, what need to be done/avoided to comply with the laws, and the reasons for the laws. <B> applies to Victorian public service departments only. <C> is irrelevant to health data. <D> would not apply to a dentist who is not a federal government department, whose annual turnover is unlikely to exceed \$3 million and who would not fulfil any of the other criteria to qualify as being subject to the Privacy Act.
19.	C	Students need to know "design tools" for representing data types (U3O2, key knowledge 12) and solutions (U3O2 KK13). In <C>, ERDs are mandated (U3O2 KK12) and data dictionaries are used to design data types. In the incorrect options, site maps are used for websites, flowcharts are irrelevant (and not in the study design anyway), and an RDBMS is a development tool, not a design tool.
20.	B	Such a dramatic change to the fundamental nature and definition of the organisation must be a strategic decision.

## SECTION B – Short answer questions (70 marks)

**Note:** with most of the answers to section B, teachers should feel free to use their judgement to accept reasonable answers that are not listed below.

### Question 1 (1 + 1 + 1 = 3 marks)

- a. Any one of:
- include the sender's identity.
  - have a working unsubscribe link.
  - have permission from the recipient to send the mail.
- b. Any one of:
- turns over more than \$3 million per year
  - trades in personal information for profit
  - volunteers to be subject to the Act.
- c. A Victorian state government department or a private contractor to such a department.

### Question 2 (2 marks)

Accept any reasonable example, such as:

- fraudulent identity
- cyberbullying or harassment
- posting of inappropriate information
- use of inappropriate language
- posting spoilers
- insulting or disobeying moderators
- adding large attachments to posts
- asking silly questions due to a failure to read the FAQs

### Question 3 (1 + 1 + 1 + 1 + 1 + 4 + 3 + 6 + 1 = 19 marks)

- a. Worm, virus, trojan infection. DDoS attack. Ransomware. Equipment theft or vandalism. Don't accept a non-specific reference to "hacking."
- b. Antivirus software. Anti-DDoS software or firewall. Keep backup copies of data offline. Lock doors and windows.
- c. Natural disaster, equipment failure, power spike or failure, software/OS crash.
- d. Backup data offsite. Use redundant backup (e.g. RAID, secondary power supply), UPS, update software, save regularly.
- e. It will be more attractive to use, which will attract customers. It will work more reliably, making it easier to use. It will offer more sophisticated features (e.g. search facilities, online shopping) that customers want. It will be more secure, making customers feel safe doing business there. It will have a general feeling of professionalism, which will instil confidence in visitors that the company is authoritative, competent, and trustworthy.
- f. It broadens her shop's "reach" to a much larger customer base. It allows customers to buy impulsively and conveniently with little effort. It allows her to promote her goods with large amounts of detailed information using colour, sound and animation. She can offer helpful information and advice, such as recipes that will increase sales as customers find new uses for her products.

g.

Aim	Tool or technique
Let site users work together to build a collaborative cheese recipe knowledgebase	<i>wiki</i>
Prevent other people on the internet from seeing the private cheese discussions of site users	<i>registration and logins requiring user names and passwords</i>
Let Deanne make announcements, give information and news, and promote her products	<i>a blog</i>

h.

Task	PSM Stage	Importance
Create a site map	<i>Design</i>	<i>A site map defines the site's scope, giving developers an idea of time, labour, and cost requirements for project planning. It also ensures they have not left out anything important.</i>
Ensure that people ordering online have entered their postcode information	<i>Development (Do not accept "validation" – it is not a PSM stage)</i>	<i>Invalid customer data could lead to failed deliveries, confusion, complaints and loss of business.</i>
Determine constraints	<i>Analysis</i>	<i>Developers must know the limits under which they will work, e.g. nature of their audience, time or technological limits, so they do not produce a solution that is inappropriate or unworkable.</i>

- i. Accept any answer that is clearly related to assisting people with disabilities (e.g. using large text, good contrast, avoiding colour combinations unsuitable for colour-blind people). Do not accept answers relating to making the site easier to find on the internet, or quicker to load.

#### Question 4 (3 + 2 = 5 marks)

- a. **Tutorial** – suitable for Jesse since he's totally unskilled and needs to be taught. Not suitable for Walter, who is already reasonably skilled and would find basic lessons a waste of time.

**User manual** – good for Walter, who can look up information on new features. Such details would probably not make much sense to a beginner like Jesse.

**Content-sensitive help** – would help both new and experienced users. Both Walter and Jesse would find it useful at times when relevant assistance was needed and referring to a manual is inconvenient.

**Note:** it is widely agreed that the study design's reference to 'content-sensitive' help is an uncorrected error. Teachers should accept either 'content-sensitive' or 'context-sensitive' in students' answers throughout this examination.

- a. One-on-one training would be sensible since their needs are so different. Once Walter has become familiar with the new software's features, he could train Jesse himself ('train the trainer'). Don't accept inappropriate methods such as lectures or small groups! Suggestions that are limited to online lessons or videos aren't really training – they are a form of documentation and cannot respond to a trainee's individual needs.

#### Question 5 (2 + 2 + 1 = 5 marks)

- a. She should use a date data type because the database can understand it as a date and perform date calculations with it, for example, time elapsed, future dates. It would also be stored more efficiently, since the database can encode the date using a representation it can process more quickly and store in less memory.
- b. Any one of these:
- a calendar control
  - using separate, labelled text boxes for the day, month, and year
  - use clear onscreen instructions or examples to indicate the date format that is expected
  - effective validation rules to detect an invalid date and warn the user of the error.
- c. Data integrity refers to the quality of data, including its accuracy, completeness, and consistency. It can also refer to data being intact (in one working unit) and without unauthorised changes. Such features help ensure that information generated from the data is reliable and trustworthy and can be used with confidence.

Data integrity also refers to the soundness of relationships between tables (e.g. every non-key field is related to a key field). Referential integrity is a state where a required key field value is missing (e.g. trying to looking up a student's ID in a table that lacks that ID, so no matching data is found).

Not all of this detail is needed to earn a mark. If a student's answer is clear about data quality, reliability and trustworthiness it will suffice.

**Question 6 (2 + 2 + 2 + 2 = 8 marks)**

- a. Answers such as the following should each earn a mark:
- data can be quickly searched.
  - data can be sorted.
  - reports (e.g. lists) can be generated in a variety of customised formats.
  - graphs can be created.
  - individual documents (e.g. receipts, certificates, invoices) can be created en masse.
  - copies of the data can easily be made and transmitted.
  - little physical storage is required.
  - changes can be made quickly and easily throughout large data sets.
  - links can be made between related data to remove data duplication.
- b. They would need to
- create separate fields for phone and fax data (1 mark)
  - remove the "or" in the supplier name field so each field only contains one datum (1 mark)
- c. Achieving 1NF means that all data can be accessed (for example, hiding a fax number in the same field as a phone number means that neither piece of data can be retrieved individually without significant parsing.) Similarly, having repeated fields (e.g. "Pet 1", "Pet 2" and "Pet 3") means that processing code will need to be duplicated for each field. It also will lead to truncated data if more than 3 pets are owned, or wasted storage space if fewer than 3 pets are owned. 1NF also makes sure that simple repetition of data is removed (i.e. exactly the same data is not entered twice).
- d. Give one mark for ideas such as:
- use CamelCase, using capital letters at the start of each word in a name. Do not just accept "CamelCase" without a description of what it is.
  - use Hungarian Notation, using a prefix that describes the object's type (e.g. numSize, intHatSize, sngWidth, txtSurname, qryFindFemales, tblEmployees, boolMarried) to avoid treating an object inappropriately. Again, no mark without an explanation to prove the student knows what the term means.
  - no spaces in field or table names.
  - use underscores to separate words in field names.
  - no meaningless abbreviations.
  - no really long names that invite typing errors or confusion with similar, long names.

**Question 7 (2 + 2 = 4 marks)**

- a. He could –
- name files consistently (for example, the newspaper advertisement files)
  - use leading zeroes before numbers so they sort properly alphabetically
  - use subfolders for each student
  - separate personal files from school files
  - use surname, firstname format so student names sort alphabetically.
- b. He must choose between two options that each have ill effects, so he's in a 'no-win' situation whichever way he goes.

While he might be helping the students toward a fantastic career, the data were not given to him for that purpose and he would be abusing the trust given to him by the owners of the data for his own selfish personal gain. However, if he does *not* accept the deal, he might deprive a student of fame and fortune, and turn down a source of easy income. Whatever he chooses, there are bad outcomes. That is the nature of a dilemma. It is important that students make it clear that he *must* decide, and that whatever his decision is there will be a bad outcome for *someone*.

**Question 8 (1 + 3 = 4 marks)**

- a. index.htm, index.html, default.htm, default.html. Also accept ".asp" and file types. If a visitor to a site does not provide a webpage filename, the web server will automatically load one of these files as an opening page. By using these special names, a visitor does not need to know what every website has chosen to name its landing page.
- b. You would be expecting a sketch showing relative positions and sizes of page components. For 3 marks, expect to see:
  - a large and distinctive page title/logo, and headings that are larger than body text (proportion).
  - logical sections divided into subsections and perhaps sub-subsections, e.g. separate sections for actors, singers etc. (hierarchy).
  - items, such as menu bars, arranged vertically, horizontally or diagonally (orientation).

**Question 9 (12 marks)**

The extended answer should contain the following information, preferably with each piece identified with a heading, or highlighting of some sort. Answers that confusingly list a lot of actions without clearly indicating what is being achieved should not earn marks. Allocate 2 marks for an effective and reasonably-efficient explanation of how to achieve each of the desired outcomes.

*Identify and report on the clients who have earned more than \$2500 total income.*

SS: use a filter to find and isolate the rows with income>2500. (students must get the ">" right to earn marks.  
RDBMS: use a query (or find) for income>2500 and create report to show/print the matching records.

*Highlight the names of clients who have generated \$1-\$200 for the agency*

Both SS and RDBMS can use conditional formatting to specially format the name text of records where OurCut >= 1 AND OurCut <=200. Again, the right operators are essential.

An acceptable alternative is finding OurCut > 0 AND OurCut < 201.

*Display the number data more effectively.*

Right-justify the numbers.

In the currency columns, either add "\$" to the column header, or display the data as currency.

*Create a list of clients, sorted by surname.*

Students should demonstrate that this is effectively impossible with the current schema. They should say that the "Star Name" field/column should be broken into two fields/columns – Firstname and Surname. Then the data can be sorted by Surname, then Firstname and then printed - using a report for the RDBMS report.

Calculate the "Our cut" value, which is 10% of the total income value.

SS and RDBMS are again very much the same. Students should be able to create the formula...

= JobsDone \* CostPerJob or

= E2 \* F2

For SS, give them their marks even if they leave off the leading "=".

*Verify that the solution is working as intended.*

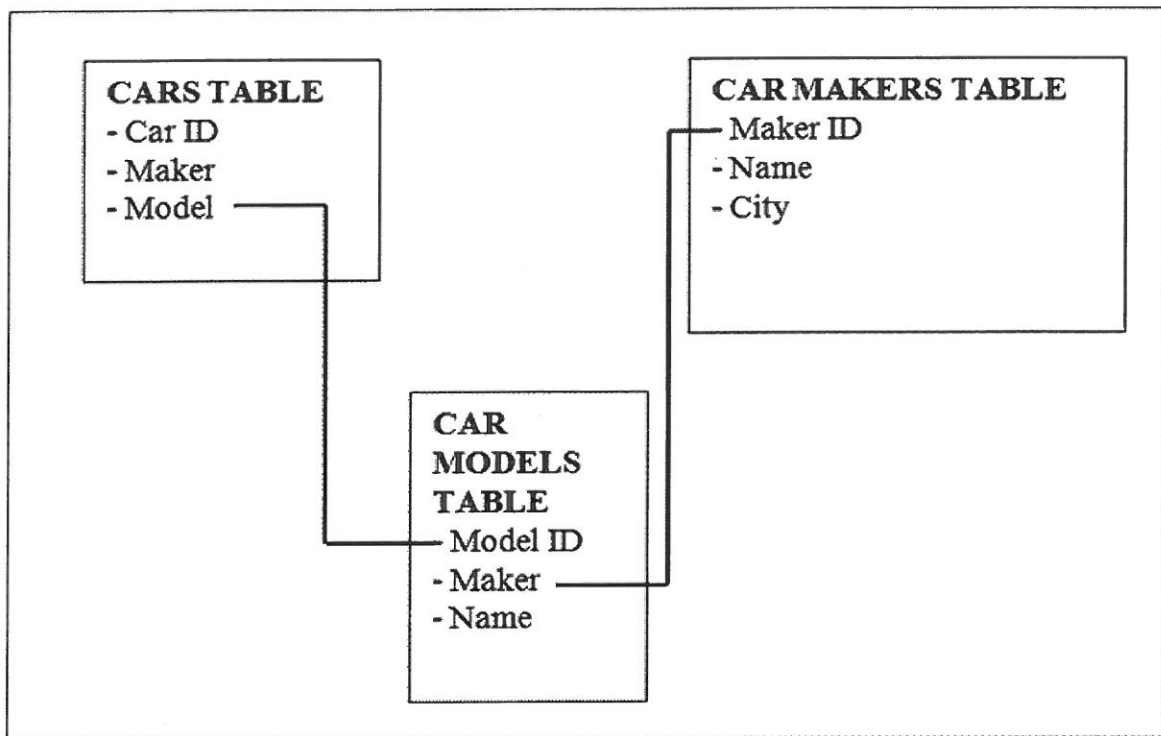
Students should describe an effective testing regime.

- Create test data containing typical data, extreme (but valid) data, and invalid data. Good test data will focus on boundary conditions where the software's behaviour should change (e.g. the conditional formatting).
- Enter the data and compare the software's answers with those calculated manually.



**Question 10 (2 + 2 + 4 = 8 marks)**

a. Give one mark for each correct relationship line.



b. Students could circle *Maker* or *Model* in the Cars table. They must choose *Maker* in the Models table.

Students could also use the infinity symbol or "crows foot" to indicate "many".

They could also use one or two small perpendicular strokes at the end of the line to signify "one".

c.

A = Car Model.

B = Makes **or** Is Made By.

C = Model ID.

D = Name **or** City.